ALESIS
Matica 500/900

Reference Manual

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CHAPTER 1
INTRODUCTION

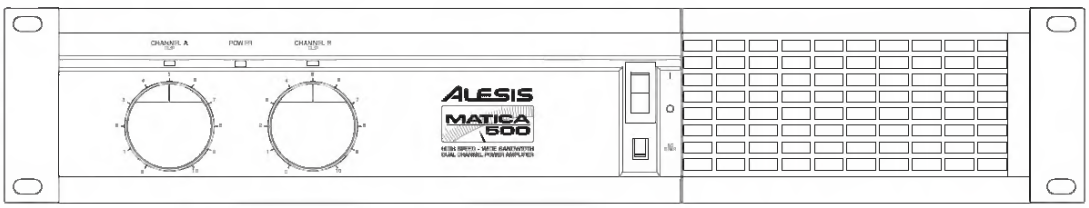

Figure 1: Amplifier front panel controls.

About Alesis Matica™ Amplifiers

Thank you for purchasing an Alesis Matica power amplifier, one of the most advanced and highest value amplifiers available.

Your Alesis High Speed, Wide Bandwidth amplifier provides extremely accurate sonic quality as well as measured specifications, but its conservative design and careful attention to electronic protection means that it will continue to operate at top condition without special attention, year after year.

Matica amplifiers use the newest generation of linear semiconductor devices for improved performance. Their high slew rate of 80 V/µs insures that they will not generate significant TIM (transient intermodulation) distortion. The outstanding signal to noise ratio (typically better than 103 dB, A weighted, below rated output) and very low harmonic distortion (typically below .009% midband) make them ideally suited for the most critical studio monitoring applications.

These amplifiers, however, are in rugged, roadworthy packages which are of minimum size consistent with conservative electronic design principles. Their power transformers have unusually high current capability for their size, thus insuring both stable power output and minimum interference with adjacent equipment.

The CoolSync™ (patent pending) transistor cooling dynamically adjusts the rate of front to back airflow depending on the power density of the program material, thus anticipating the need for cooling rather than merely reacting to temperature. The airflow cools all components, not merely the output transistors.

Detented level controls are on the front panel, where they can be easily adjusted if necessary. Both the power switch and the circuit breaker are on the front panel so that in case of problems, the breaker can be reset without requiring access to the rear of the amplifier. Clip lights for each channel indicate the onset of actual

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clipping, not just a designated output voltage which may not correspond to the clipping point if power line voltage is low.

The rear panel inputs can be via gold plated 1/4" (6.3 mm) phone jacks, gold plated 3 pin XLR-type connectors or barrier screw terminals, all of which are standard equipment. Outputs are on five-way binding posts which can accept large diameter wire or 3/4" (19 mm) spaced dual banana plugs. A recessed rear panel switch allows easy selection of stereo or bridged monaural operating modes. Separate signal and chassis ground points are available to handle any grounding scheme.

Matica amplifiers have high current output protection relays which disconnect the output in the event of overtemperature, DC offset, audio signals below 5 Hz on the output terminals or excessively low line voltage. When AC power is applied to the amplifier, the relay does not engage immediately; a 4–5 second delay allows the amplifier circuitry to stabilize and prevents turn-on transients from other equipment powering up during that time from being reproduced by the loudspeakers. **The cooling fan is also momentarily exercised at high speed at turn-on.** When AC power is turned off, the speaker protection relays immediately disconnect, thus keeping turn-off transients from reaching the speakers. Additional protection circuitry keeps RFI out of the audio circuits, assuring clean, stable operation in difficult environmental conditions.

An aLink™ 25-pin connector is provided for future expansion by the user. Among the planned accessories for attachment to this connector are outboard signal processors, electronic crossovers and remote controllers. Also planned are an internal module to allow soft turn-on and remote turn-on/turn-off; the internal module is for installation by qualified personnel. See your Alesis dealer for information on these options.

Why Another Power Amplifier?

Professional power amplifiers of today tend to fall into several groups. Those aimed at the performing musician's sound reinforcement needs are often designed for the highest possible power output at the lowest possible price. Those intended for portable sound reinforcement are frequently designed for minimum weight and size, while fixed reinforcement amplifiers are often made to fit a laundry list of requirements.

In all too many of these situations, the sonic character of the amplifier is low on the list of design priorities. A professional amplifier must be reliable under all circumstances, of course, because people's livelihoods and even their safety can depend on its proper operation. And yet, the primary purpose of any audio amplifier is reproducing sound with as high quality as possible.

The new Alesis amplifiers meet the stringent requirements of both fixed and touring sound reinforcement, but they do not sacrifice sonic excellence to achieve their professional credentials. Highly sophisticated engineering which takes advantage

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of recent developments in electronic componentry, and innovative design concepts make the Alesis power amplifiers ideal for any professional application.

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CHAPTER 2
INSTALLATIONS

Unpacking and Inspection

Carefully unpack the amplifier and inspect it for physical damage originating in shipping. Do not discard the packing materials; they may be helpful in shipping the amplifier when it is not mounted in a rack or other enclosure.

If damage is discovered and the amplifier was shipped to you, immediately contact the transportation carrier and make certain that the packing materials are preserved for inspection. You as the consignee must make any shipping claims; neither your dealer nor Alesis can do this for you. If the amplifier was not shipped to you, i.e. you picked it up from your dealer, contact the dealer as soon as possible for assistance.

Physical Installation

Alesis Matica 500 and Matica 900 amplifiers take up only two rack spaces each (3.5" panel height). If multiple amplifiers are mounted in the same rack, there should be at least one rack space left between them; solid blank panels may be used to fill the spaces, but perforated grilles used as fillers will help exhaust the hot air from within the rack.

An exhaust fan is required in a rack with a closed back to assure sufficient air exhaust capacity. If the rack has a door limiting access to the front panels, the door should have ventilation grilles in it or other provisions should be made to assure a free flow of air through the front panels of the amplifiers.

Note: Unusually high ambient or operating temperatures may cause the thermal protection circuitry to open the internal output protection relay. Once the amplifier has cooled, the relay will automatically close and the amplifier will resume operation without user intervention.

While the amplifier's 14 gauge front panels are strong enough to support their entire weight in fixed installations, Alesis strongly recommends using the Matica's rear rack supports in all installations. Support at the rear is a must for portable and road use.

Matica amplifiers are well shielded; however, mounting low level electronics some distance away from power amplifiers is common practice to reduce the possibility of electromagnetic interference into the low level units, which may sometimes be unusually susceptible to picking up such radiation.

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Electrical Installation

One of the most important considerations for proper installation and operation of a power amplifier is the capacity of the line feeding the mains voltage to the amplifier. If the line does not have sufficient current capacity, the amplifier may not be able to deliver its full rated output, both steady state and peak, with the result that the sound character can dramatically suffer.

For best performance, assure that the power line feeding each amplifier can supply adequate line voltage and current. Under most circumstances, normal household or commercial power outlets will be adequate. However, when low impedance loads are used with high maximum output power, additional current capacity may be required.

The Audio Ground is DC isolated from the chassis, although there is an RF bypass capacitor between Audio Ground and the chassis ground as part of the Matica's RFI protection circuitry. If a hard-wired connection between Audio Ground and the chassis is desired, a jumper wire may be connected between the Audio Ground screw on the input barrier strip and the adjacent ground screw on the chassis. The amplifier is shipped with no connection between these screws, which is the preferred method of use.

The AC cord is designed to be fed by an outlet that includes a solid earth ground. This ground connection is an important safety feature designed to keep the chassis of electronic devices such as the Matica amplifiers at ground potential. Unfortunately, the presence of a ground contact in an AC socket does not always indicate that an outlet is properly grounded. Use an AC line tester to determine this. If the outlet is not grounded, consult with a licensed electrician.

Do not operate any electrical equipment with ungrounded outlets. Plugging a Matica amplifier into an ungrounded outlet or "lifting" the unit off ground with a three-to-two wire adapter can create a hazardous condition. Alesis cannot be responsible for problems caused by using Matica amplifiers or any associated equipment with improper AC wiring.

Note: Alesis amplifiers are pre-wired at the factory for the line voltage in the country where the amplifier is intended for sale and are supplied with appropriate line cords. They are not readily convertible to other voltages. Before connecting them to the power line, check to be certain that they are properly wired for use in your country.

When wiring a rack, it is good installation practice to route all AC wiring along one side of the rack and all audio wiring along the other side to avoid coupling AC-borne interference into the audio.

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Audio Installation: Input Wiring

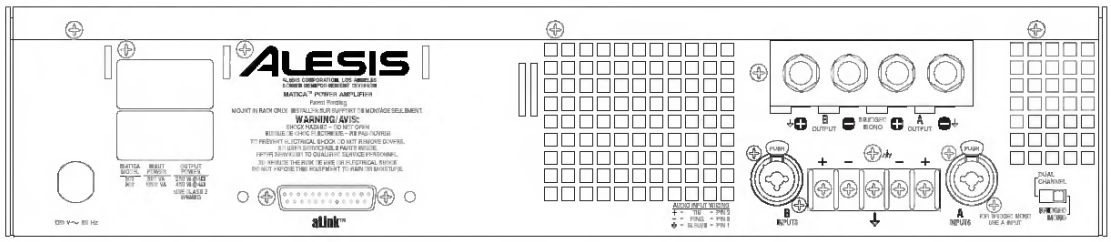

Figure 2: Amplifier rear panel controls and connections.

Warning: Be sure that the AC power is off prior to connecting or disconnecting any signal wiring.

The input circuits of the Alesis amplifiers are electronically balanced. They may be fed from either symmetrical ("balanced") or unbalanced sources. There are two combination XLR/1/4" (6.3 mm) jacks provided, one for each channel, and a barrier screw terminal strip for connecting bare wire or crimp terminals. See Figure 2.

The inputs are wired according to IEC standards:

Connection	XLR	Phone Jack
Audio Ground	Pin 1	Sleeve
High (+)	Pin 2	Tip
Low (–)	Pin 3	Ring

Table 1: Input Wiring

Figure 3. Balanced wiring of an XLR input connector.

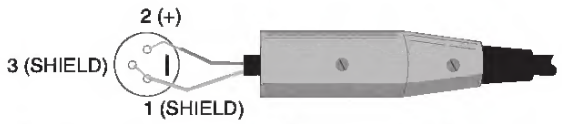

Figure 4. Unbalanced wiring of an XLR input connector.

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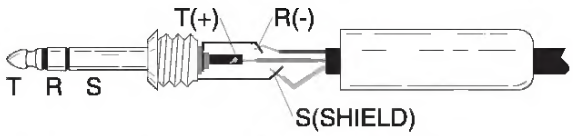

Figure 5. Balanced wiring of a 1/4" (6.3 mm) three-wire phone plug.

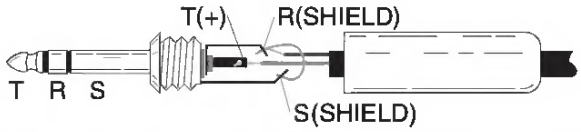

Figure 6. Unbalanced wiring of a 1/4" (6.3 mm) three-wire phone plug

All input wiring should be done with shielded cable. To use an unbalanced source with an Alesis amplifier, connect the High (+) signal wire as shown in Table 1 and connect the shield wire to both the Low (–) and Audio Ground input connections. See Figure 4 and 6. If a two-wire (tip and sleeve only) phone plug is used for an unbalanced input, the sleeve of the plug will automatically connect the Low and Audio Ground connections together inside the amplifier.

Long input cable runs, particularly in areas with high electrical interference, should be done with symmetrical ("balanced") configuration, if possible, to lessen the possibility of interference being picked up by the cables.

Since the input jack and barrier screws for each channel are connected in parallel, only one of these should be used unless the same signal is to be connected in parallel to another amplifier channel.

The input impedance of the Alesis amplifiers is 20 kΩ in balanced or unbalanced configuration. Thus, the inputs of several amplifiers may be connected in parallel if desired. The maximum number of amplifier channels will depend on the minimum output load impedance of the device feeding the amplifiers. For example, if the minimum output load impedance of the source device is 600 Ω, up to 30 amplifier channels may be connected to it in parallel without overloading the source device's output.

To use the amplifier in Bridged Mono mode, connect the input signal to Channel A only and move the recessed slide switch to the Bridged Mono position. The Channel B input will be inactive. See below for output wiring in Bridged Mono configuration.

Audio Installation: Output Wiring

Warning: Be sure that the AC power is off prior to connecting or disconnecting any signal wiring.

Alesis amplifiers can reliably drive 2 Ω loads in Stereo mode and 4 Ω loads in Bridged Mono mode. However, the impedance of a loudspeaker varies with frequency, and its nominal rated impedance is not necessarily its minimum impedance. Some loudspeakers carry both nominal and minimum impedance specifications, and some are supplied with impedance curves. When connecting

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multiple loudspeakers or systems to any amplifier, care should be taken that the actual load impedance does not drop below the amplifier's rated output load. Alesis amplifiers will not be damaged by excessively low output load impedances, but they will not be able to provide full output power and their protection circuits may automatically cut off their outputs until the low load condition is removed.

Gauge (AWG)	Diameter (Solid)	DC Resist./ 30 m (100′)	Cable Length Resulting in a 1 dB Power Loss			
			4 Ω Load Impedance		8 Ω Load Impedance	
6	4.12 mm	0.08 Ω	366 m	1200′	740 m	2400′
8	3.26 mm	0.13 Ω	244 m	800′	488 m	1600′
10	2.59 mm	0.20 Ω	145 m	475′	290 m	950′
12	2.05 mm	0.32 Ω	91 m	300′	182 m	600′
14	1.63 mm	0.52 Ω	58 m	190′	116 m	380′
16	1.29 mm	0.82 Ω	37 m	120′	74 m	240′
18	1.02 mm	1.32 Ω	23 m	75′	46 m	150′
20	0.81 mm	2.08 Ω	15 m	50′	30 m	100′
22	0.64 mm	3.30 Ω	9 m	30′	18 m	60′

Table 2: Speaker Cable Losses. Values are calculated based on the sum of the length of both conductors. Note that a 1 dB power loss is equivalent to 12% of the amplifier power.

The wire thickness or gauge should be chosen according to the load impedance and the length of the wire run from the amplifier to the loudspeaker terminals. See Table 2.

Because the wire's resistance to the flow of current is in series with the loudspeaker, a wire with lower resistance will deliver more power to the loudspeaker; also, the amplifier will be able to control the loudspeaker's movement better—this latter is called "damping factor."

It's interesting to observe that an amplifier's rated damping factor is essentially unrealizable unless the loudspeaker is connected directly to the amplifier's output terminals without any interconnecting cables. For example, a typical installation using 20 feet (6 m) of 16 AWG wire connecting an amplifier and an 8 ohm speaker will result in a damping factor of 23.5 with a perfect amplifier; with a real world amplifier, the damping factor will be even lower.

Many special cables are sold for use with audiophile and studio loudspeakers. We make no recommendations for cables other than that there be sufficient copper in them to keep the total resistance acceptably low.

Loudspeaker outputs for both channels are on heavy-duty five-way binding posts which can accept single or dual banana plugs, bare wire or terminals. See Figure 2 above. Note the unique in-line configuration of these binding posts.

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Banana plugs are inserted in the ends of the plastic insulating nuts on each output terminal. The terminals are spaced to accept standard 3/4" (19 mm) spaced dual banana plugs. Alternately, the insulating nuts may be loosened so that stranded or solid wire may be attached. The threaded posts under the nuts have holes in them which can accept fairly heavy gauge wire, but if the wire does not fit through the hole, it may be wrapped around the post. In either case, the nut should be snugly tightened to secure the wire in place.

Caution: Be sure that no stray wire strands accidentally touch an adjacent wire or terminal. Lightly tinning the end of a stranded wire with solder after the strands are twisted together will help prevent it from fraying and will insure that all strands are connected, but be careful when tightening or stressing the wire—tinned wires may be brittle.

If a crimp lug terminal is used on the speaker wire and the lug is too small to fit onto the threaded post, one leg of the terminal may be inserted in the hole in the post. As with wire connections, make certain that the terminal is snugly attached by tightening the plastic insulator nut.

A positive voltage applied to the High (+) side of either input when the amplifier is in Stereo mode will result in a positive voltage appearing on the Red (+) terminal of the corresponding output channel.

When connecting the output of the amplifier in Bridged Mono mode (assuming that the input has been connected to Channel A and the Stereo/Mono rear panel switch has been set to Mono), the loudspeaker wires are connected to the two center terminals only. Note that, unlike amplifiers from some other manufacturers, Bridged Mono connections are to Red and Black terminals, *not* to two Red or two Black terminals. Do not connect anything to either of the two outer terminals.

In Bridged Mono mode, applying a positive voltage to the High (+) side of the Channel A input connection will result in a positive voltage on the Red output terminal (Channel A +).

Note that Channel B of each Matica amplifier is internally inverting, which assures the maximum possible low frequency output when both channels are driven. Connecting the wiring as described above will keep the input to output signal polarity consistent. However, the Black terminals of Channels A and B are not at the same potential and must not be connected together. Some loudspeaker switching systems and many headphones use common wiring for the low sides of both channels; these systems cannot be used with Matica amplifiers unless the alternate wiring instructions below are followed.

Operation with a common output wiring is possible by connecting the black output binding post of the A channel to the red post of the B channel. This is now the common speaker or headphone output lead and is at ground potential. The remaining red and black posts are the Channel A and B "hot" connections respectively.

Next, the audio input to the amplifier must be from a balanced source. Wire the A Channel balanced input wiring with normal polarity but wire the B Channel's input with the Polarity inverted.

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What we're doing here is compensation for the fact the Matica's B Channel is normally internally inverted and then re-inverted at its output. This improves the amplifier's ability to respond to high power low frequency signals better than conventional amplifiers. The input and output wiring changes above "invert the inversion" so the net effect is proper signal polarity and amplification with the ability to operate both channel's outputs tied to a common speaker lead.

System Setup and Testing

Before applying power for the first time, double check the wiring to insure that everything is firmly connected and that the proper signals are being fed to the proper places. If a low frequency signal in a multi-amplified system is applied to a high frequency transducer, the transducer can be damaged, and a loose connection can cause noise which can damage any transducer.

Be certain that the amplifier front panel gain controls are set to minimum when the system under test is first powered up. After the power is applied, slowly advance each gain control to confirm that there are no driver-destroying hums or buzzes present—if there are, turn the power off and locate the source of the difficulty. When first applying program material to the system, it is also advisable to keep the gain controls turned down to confirm, once again, that the wiring is correct. Once the system wiring is determined to be correct, the gain controls can then be set to an appropriate level for the system gain structure.

Setting the system gain is fairly straightforward, but if it is not properly adjusted, the system's distortion and noise characteristics may be less than optimum. The input sensitivity of the Alesis amplifiers is 0.775 volts (0 dBu) for rated output with the amplifier gain controls at maximum. If the signal at the amplifier input is higher than this, the input gain controls must be turned down to avoid amplifier clipping.

It is generally best to try to keep the gain of the source device balanced for best signal-to-noise ratio consistent with distortion and to turn down the amplifier inputs to reduce the amplification of noise artifacts originating prior to the signal's reaching the amplifier.

The maximum level at the amplifier's input terminals is +22 dBu (10 V RMS). It is possible that the output signal from the source may be too high and, thus, distorted before it reaches the amplifier gain control, either because the source device is clipping or the amplifier input stage is overloaded. In either case, no amount of level control adjustment at the amplifier can remove this distortion, and the device feeding the amplifier should have its gain lowered until the level is within proper bounds.

It is also possible, particularly when using very efficient loudspeakers, that the sound level from the loudspeakers may be too high when the amplifier is driven to full output. In such cases, leaving the amplifier gain at maximum and turning down the signal source's output level can result in audible noise products in the signal coming from the source device or wiring. As above, keeping the source level as high as possible and lowering the amplifier input gain will keep the noise level at a minimum.

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CHAPTER 3
AMPLIFIER OPERATIONS

Once all gain adjustments are made and proper operation is confirmed, no special considerations are required for Matica amplifiers. Aside from the front panel gain controls, there are no user adjustments or routine maintenance operations necessary (or available).

When powering a system on or off, it is usually advisable to turn on the power amplifiers last and to turn them off first, so that any turn on or turn off transient signals generated by other equipment in the system are not amplified and sent to the loudspeakers. However, Matica amplifiers' protection relays have a 4 to 5 second turn-on delay which keeps the loudspeakers disconnected while the system is powering up. These relays also disconnect the load very quickly when power is removed from the amplifiers, thus minimizing the chance that turn-off transients originating elsewhere in the system will be sent to the speakers.

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CHAPTER 4
IN CASE OF TROUBLE

No Sound

- Is the power switch on? If not, turn it on.
- Is the power light on? If not, confirm that the amplifier is plugged into a live AC mains circuit of appropriate voltage and current capacity.
- Check the circuit breaker and reset it if it is open. If the breaker opens immediately, there may be a short circuit across the output terminals; if not, there is a possible internal fault in the amplifier which will require service by a qualified technician.
- Is the amplifier input connected to a live signal source? Is the loudspeaker solidly connected to the amplifier output at both ends of the speaker cable? Is the speaker faulty?
- Is the amplifier very hot? Is the ambient temperature and/or the air flow in the rack abnormal? If so, the amplifier may be in thermal protect mode; normal operation will resume when its internal temperature has dropped to reliable levels.

Weak or Distorted Signal

- Is the signal source working correctly?
- Is the wiring to the amplifier input properly connected at both ends?
- Have the gain controls of the signal source or the amplifier been moved since the system was set up?

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Hum and/or Noise

- Is the signal source working correctly?
- Are the system's electrical and audio ground connections proper?
- Are there any noise-producing sources on the AC mains circuit, such as light dimmers, motors, etc.? If so, it may be necessary to run a separate power line for the audio equipment.

Thin or Muffled Sound

- Are the loudspeakers all working properly, or are one or more drivers defective?
- In a multi-amplified system with a low level crossover network, are all outputs from the network operating properly? Are all loudspeakers properly connected?
- Are both sides of a balanced input solidly connected? Is the low side of the amplifier input connected to Audio Ground with an unbalanced input connection?

Audio Cuts In and Out

- Is the signal at the amplifier input terminals good?
- Are all the input and output wires solidly connected?
- If the sound cuts out for a minute or two and then returns, is the amplifier overheating and cycling through thermal protect mode? If so, check for short circuits in the output wiring or excessive ambient temperature.

Channel B Shows Heavy Clipping, Channel A is OK.

- The two black output binding posts have been connected together. These terminals are not at the same potential and cannot be connected without special wiring consideration. See page 10.

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CHAPTER 5
REFERENCE

Preliminary Amplifier Specifications

Power Output*	8 Ω 2 Channel	4 Ω 2 Channel	2 Ω 2 Channel	8 Ω Bridged	4 Ω Bridged
Matica 500	162 W	250 W	350 W	500 W	650 W
Matica 900	270 W	450 W	680 W	900 W	1350 W

*Typical, 1% THD @ 1 kHz; two-channel ratings are for each channel, with both channels driven to rated output.

Frequency Response: 10 Hz – 80 kHz, +1, –3 dB (–0.1 dB @ 20 kHz)

Slew Rate: 80 V/µs (two channel), 160 V/µs (bridged mono)

THD: 0.009% @ 1 kHz, 4 Ω load

Hum and Noise: Better than 103 dB below rated output, A weighted

Input Sensitivity: 0.775 V RMS for rated power

Input Impedance: 20 kΩ, balanced or unbalanced

Cooling System: CoolSync™ (patent pending) cooling fan speed controller with additional secondary high speed mode. Front to rear airflow cools all internal components

Controls, Indicators and Connectors:

Front Panel: Rocker style high inrush power switch, manually resettable circuit breaker, green LED power indicator, individual detented level controls and individual red LED clip indicators

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Rear Panel:	Balanced gold plated 1/4" (6.3 mm)/latching XLR-type input connectors, slotted/Phillips screw terminal barrier input connector, heavy gauge 5-way binding post output connectors, recessed stereo/bridged mono slide switch, DB-25 aLink™ accessory connector and mounting holes for accessory boxes, strain relieved line cord, chassis ground connection screw
Dimensions:	3 1/2" x 19" (2U) panels Matica 500: 12 1/4" (311 mm) depth Matica 900: 16 1/8" (410 mm) depth
Net Weight:	Matica 500: 30 lb (13.6 kg) Matica 900: 48 lb (21.8 kg)
Chassis Construction:	14 gauge black powder-coated steel construction with integral front and rear rack mounts. All controls, connectors and hardware on all surfaces recessed for protection.

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